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The feasibility of using vocalization scoring as an indicator of poor welfare during cattle slaughter

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The feasibility of using vocalization scoring as an indicator of poor welfare during cattle slaughter

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Abstract

Vocalizations of cattle in six commercial slaughter plants were tabulated during handling in the forcing pen stunning box and single file race. Each animal was scored as being either a vocalizer or nonvocalizer. Vocalizations that occurred in the lairage pens were not counted. A total of 1125 animals were observed during normal operations and 112 cattle vocalized. All vocalizations, with the exception of two, occurred immediately after a stressful event such as electric prodding, slipping on the stunning box floor, missed captive bolt stuns, or excessive pressure exerted on the animal's body by a restraining device powered by pneumatic cylinders. Electric prodding was associated with vocalization in 72 animals. In four plants, cattle were moved quietly at a walk in small groups, and electric prods were used only on cattle that refused to move. The percentages of cattle that vocalized in the stunning box, single file race and forcing pen in these four plants were 1.1%, 2.6%, 6.6% and 7.5%. Vocalizations were associated with slipping on the stunning box floor, excessive pressure from a powered tailgate and electric prodding when an animal balked because it saw a moving person up ahead. In two other plants, 90% and 76% of the cattle were prodded with an electric prod. When this excessive prod usage was stopped, vocalizations dropped from 32% to 12% of the cattle in the first plant, and from 12% to 3% in the second plant. The remaining vocalizations were due to missed stuns and excessive pressure from a restraining device. Vocalization scoring could be used as a simple method for detecting welfare problems that need to be corrected. © 1998 Elsevier Science B.V.

Keywords: Cattle slaughtering; Vocalization; Handling welfare

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1. Introduction

There are increasing concerns about the welfare of livestock during slaughter. Extensive studies have been conducted to assess different stunning methods (Eikelenboom, 1983; Croft, 1952; Cook, 1992; Gregory, 1994). However, little research has been done to develop practical behavioral measures to assess animal welfare during handling in commercial slaughter plants. The author has observed in several hundred slaughter plants that enforcement of humane slaughter laws often varies greatly from plant to plant and country to country. What one inspector may consider to be an acceptable industry standard for handling, another inspector may call animal abuse. There is a need to develop objective scoring methods for animal welfare that can be used under commercial conditions.

Previous research with cattle and pigs has indicated that vocalizations are an indicator of stress. Warris et al. (1994) found that the sound level of pig vocalizations and squeals in commercial slaughter plants was positively related to increases in blood lactate and CPK. Further research with pigs examined vocalizations during castration with and without the anesthetic lidocaine. Piglets castrated without an anesthetic had higher heart rates and higher pitched squeals (White et al., 1995). Dunn (1990) studied cattle in commercial slaughter plants that were restrained by different methods. Cattle that were inverted onto their backs had significantly higher cortisol levels and more vocalizations per animal compared to cattle held in a device that held them in an upright position. A greater proportion of the inverted animals vocalized compared to those in upright restraint (Dunn, 1990).

The purpose of this study was to determine if counting the number of cattle that vocalize while the animals were moving through the leadup race, and when they were in the stunning box, could be used as a simple objective method for quantifying cattle discomfort under commercial conditions. The advantage of vocalization scoring is that, it is very objective and easy to tabulate. Each animal can be classified either as a vocalizer or a nonvocalizer. An animal either vocalizes or not, and no sophisticated equipment is required. Other signs of distress such as agitation or struggling are much more subjective.

2. Methods

2.1. Slaughter plant sample

All observations were conducted in commercial slaughter plants during regular operations. Six Federally inspected beef slaughter plants were surveyed, located in the vicinity of three randomly chosen cities in the United States. The line speeds of the plants varied from 50 to 110 cattle/h. None of the plants surveyed had a conveyor restrainer and they all had either a conventional stunning box or a box with an apparatus for mechanically restricting movement of the animal's head and body. Plants 2, 3, 4, and 6 had conventional stunning boxes and plants 1 and 5 had mechanical restraint devices.

2.2. Vocalization scoring

At each plant, 100–250 cattle were scored while they were being moved into the stunning box. No attempt was made to pick certain groups of cattle. Animals moving through the system at the time of the visit were scored. A variety of cattle types were observed, ranging from beef breed grainfed steers to cull Holstein dairy cows. Cattle that vocalized were counted as they passed through the forcing pen, leadup race and stunning box. No attempt was made to assess the intensity of vocalizations, or count the number of vocalizations per animal. Each animal was recorded as either a nonvocalizer or a vocalizer. Animals that vocalized both in the forcing pen and in the stunning box were counted only once. The observations were made from the handler's catwalk near the entrance of the stunning box. From this position, both the stunning box and the forcing pen could be observed. This method of scoring was used because it is simple enough for routine use under commercial conditions. Vocalizations occurring in the lairage pens were not tabulated.

In plants where cattle were moved quietly at a walk in small groups, and electric prods were only used on animals that balked, a total of 150 to 200 cattle were tabulated. In plants where over 75% of the animals were often repeatedly prodded with electric prods, 100 to 175 cattle were scored to obtain a vocalization baseline. No attempt was made to count the number of times an animal was electric prodded. It was tabulated as prodded or not prodded. After a baseline vocalization score was collected, the author asked the plant manager to instruct his employees to attempt to move the cattle into the stunning box without using an electric prod. The employees were instructed to tap the animal on the rear first and use only an electric prod on the animals that refused to move after being tapped. They were told to keep up with the slaughter line but attempt to minimize prodding. After 5–10 min of instruction, an additional 75 to 100 cattle were scored. A total of 1125 cattle were observed in this study in six different plants.

3. Results

3.1. Incidence and cause of vocalizations

In all six plants, a total of 112 cattle vocalized in the single file leadup race, stunning box, or forcing pen that leads up to the single file race. With the exception of two animals, all of the these cattle vocalized immediately after an aversive event such as electric prodding, slipping on the stunning box floor missed, captive bolt stuns or excessive pressure exerted by a powered restraining device. Seventy-two animals vocalized when they were prodded with an electric prod. Therefore, electric prod usage was associated with 64% of the vocalizing animals.

The vocalizations that were associated with excessive pressure could be observed because the animals remained quiet when they first entered the stunning box. In plant 1, the animal was restrained by a tailgate powered by a pneumatic cylinder that pressed against its rear. When the gate first started to press on the animal, it remained quiet, but as the gate applied greater amounts of pressure, it vocalized. In plant 5 where excessive

Table 1
Cattle vocalization in beef slaughter plants

Plant no.	Hourly line speed	Number scored	Electric prod vocalizations (%)	Slipping vocalizations (%)	Missed stun vocalizations (%)	Excessive pressure vocalizations (%)	Total % vocalizations	Comments
Plant 1	110	200	0	3.25	0	3.25	7.5	
Plant 2	175	150	1.95	0	0	0	2.6	An animal left alone in the race vocalized
Plant 3	70	150	5.94	0.66	0	0	6.6	
Plant 4	50	175	1.1	0	0	0	1.1	
Plant 5	90	175	19	0	5	8	32	Large Holsteins were too long to fit in the mechanical restrainer
Plant 6	85	100	9	0	2	0	12	One animal vocalized for no observable reason

This table shows the percentage of animals that vocalized and were associated with different aversive events. For plants 2 and 6, the total vocalization percentage is greater than the percentages in the aversive events column because one animal in each of these plants had vocalizations that were not associated with a listed aversive event.

Table 2
Reduction in vocalizations in two beef plants when excessive usage of electric prods was stopped

	Number scored	Percent vocalizing	Number vocalizing	Percent electric prodded	χ^2
Plant 5					
Rough handling baseline	175	32[a]	56	90	0.002
Improved handling	75	13[b]	10	14	
Plant 6					
Rough handling baseline	100	12[a]	12	76	0.02
Improved handling	100	3[b]	3	20	

Percentages with different letters are significantly different.

pressure was associated with vocalizations, the animals were quiet when a head-holding device initially started to apply pressure, but they vocalized as the pressure increased (Table 1).

Plants 1 through 4 had employees who moved cattle quietly in small groups at a walk, and an electric prod was only used on animals that balked and refused to move. The percentage of cattle that vocalized in the stunning box, leadup race or forcing pen in these four plants ranged from 1.1 to 7.5% (Table 1). In plants 5 and 6, 90% and 76% of the cattle were prodded with an electric prod, and in plant 6 abusive employees used an electric prod to paralyze cattle to hold them still for stunning. The vocalization's percentages in plants 5 and 6 were 32% and 12% of the cattle, respectively (Table 1). The reasons for cattle vocalizations in the six plants are shown in Table 1.

3.2. Reduction in vocalization

In plant 5, although excessive pressure from the head-holding device could not be fixed, vocalizations were significantly reduced from 32% of the animals to 13% when the employees were instructed to tap the animal on the rear before resorting to the electric prod (Table 2). Unfortunately, it was not possible to score more than 75 cattle in the reduced electric prodding group because the foreman insisted on prodding the cattle although the slaughter line was kept full when electric prod use was reduced. In plant 6, it was possible to significantly lower the percentage of animals vocalizing from 12 to 3% (Table 2). In plants 5 and 6, although no equipment modifications were made, the employees were able to keep up with the slaughter line when electric prodding was reduced.

4. Discussion

These results show that vocalization that occurs during handling in the forcing pen, leadup race or stunning box may be a useful objective indicator of poor cattle welfare during slaughter because 98.2% of the cattle that vocalized did so immediately after an observed aversive event. The surveyed plants could be separated into two categories. The employees in plants 1, 2, 3 and 4 moved small groups of cattle at a walk and only

used electric prods on cattle that refused to move, whereas the employees in the two other plants repeatedly prodded a high percentage of cattle. The percentage of cattle vocalizing in the four plants with skilled careful handlers averaged only 4.5%, whereas the average vocalization for the two plants with excessive electric prod usage was 22%.

4.1. Equipment effects on vocalization

Only one plant had a modern curved race which led to the stunning box. In this plant, there were no vocalizations in the single file race or forcing pen. Curved races with solid sides facilitate cattle movement (Grandin, 1980, 1993). Poorly designed head restraint devices in plants 1 and 5 were associated with vocalizations. In both of these cases, vocalizations were induced by both faulty equipment design and excessive pressure applied by a pneumatic cylinder.

The author has observed in plants that were not in this survey that cattle can be restrained in a well-designed head restraint device and less than 2% of the animals will vocalize. Further observations indicated that vocalizations are reduced if captive bolt stunning or ritual slaughter is conducted immediately after the head is restrained. In plants that were not in this survey, the author has observed that when the pressure is correctly adjusted, the cattle will not vocalize while the device is applying pressure. Cattle will remain calmer and less likely to show behavioral agitation when pressure is applied with steady slow movements (Grandin, 1992, 1995). Sudden jerky motion of the apparatus and noise such as air hissing will often cause cattle to become behaviorally agitated (Grandin, 1992, 1994). Observations also indicate that cattle will stay calmer in a restraint device if optimum pressure is applied. It must hold the animal tight enough so that it feels held, but not so tight that it causes pain (Grandin, 1994, 1995). Solid fences and shields to block the animal's vision will also keep cattle calmer.

4.2. Electric prod effect on vocalizations

Prodding with an electric prod was associated with 64% of the vocalizations. Plants 5 and 6, which had the highest percentage of cattle prodded with electric prods, had homemade prods that were attached to an unknown power source. The author observed that these prods caused a greater behavioral reaction from the animal than battery-operated prods made by Hotshot Products (Savage, MN), which are used in many plants in the US. The homemade prods were capable of paralyzing cattle. Many animals in plant 5 vocalized even when briefly tapped.

Plants 1, 2, 3 and 4 had electric prods wired through a transformer that caused no visible agitated reaction when cattle were briefly tapped once. The prods used in Plant 2 were battery-operated prods (Hotshot Products) and a prod wired through a transformer located at the stunning box. The author observed that the prods used in the first four plants caused less visible behavioral reactions from the animals than the prods in plants 5 and 6.

There were two factors that appeared to cause increased vocalization scores in plants 5 and 6. They were excessive use of electric prods, and the use of prods that caused a greater behavioral reaction from the animals than the prods used in plants 1 through 4.

When plants 5 and 6 improved their cattle handling, the percentage of animals prodded with an electric prod was greatly reduced. In plant 5, electric prodding was reduced from 90% of the cattle to 14%, and in plant 6, electric prodding in the leadup race declined from 76% of the cattle to 20%. In both plants, the slaughter line was kept full when prodding was reduced. Casual observations in several beef plants that had higher line speeds than the surveyed plants indicated that electric prods can be eliminated in the forcing pen that directs the cattle into the single file race. The author has worked with plants where 90 to 95% of the cattle were moved through the entire system without the use of an electric prod. The line speed in these plants was over 200 cattle/h.

Vocalization scoring must only be conducted when animals are actually being moved through the forcing pen, race, stunning box or restrainer. Cattle standing undisturbed in the lairage will often vocalize to each other in the absence of an observable aversive event.

4.3. Distractions cause balking

Plants 3, 5 and 6 had distractions that caused animals to balk. Although employees at plant 3 had to prod 64% of the cattle, few animals vocalized because the electric prod was weak. Brief taps had little visible effect, except that it made the animal move. It was impossible to reduce the percentage of cattle prodded in this plant. They balked and refused to move because they could see a person's hand under the stunning box door.

In plant 5, a high-pitched noise emitted by a blood pump and shadows in the forcing pen caused the animals to balk and refuse to enter the leadup race. Since many of the problems in this plant were caused by abusive employees, it was still possible to reduce electric prodding although the facility contained distractions that caused balking. In plant 6, air hissing from the control valves that operated the stunning box seemed to make cattle balk. Compared to the other four plants, plants 5 and 6 had more distractions. Grandin (1996, 1980) and Kilgour and Dalton (1984), report that distractions such as shadows, air hissing, shiny reflections, air blowing in the faces of approaching animals, high-pitched noises and seeing people up ahead will impede livestock movement on both farms and in slaughter plants. Animal movement in livestock facilities can be facilitated by using lights to attract animals into races and restrainers. (Grandin, 1980, 1996). The lights must not shine directly into the faces of approaching animals.

5. Conclusions

Vocalization scoring could be used as a practical way to pinpoint animal welfare problems in slaughter plants. It has the advantage of being objective because a bovine either vocalizes during handling or it does not. Two plants out of six plants in this survey had vocalization percentages of less than 3% of the cattle. The author has observed that in many well-managed slaughter plants, less than 3% of the cattle vocalized when they were being moved through the forcing pen leadup race and stunning box.

Excessive electric prodding, slipping on the floor, too much pressure applied by a restraining device and missed captive bolt stuns were associated with 98.2% of vocalizations. These aversive events should be regarded as welfare problems during handling of cattle at slaughter plants. Excessive use of electric prods was associated with the most vocalizations. It was possible to substantially reduce cattle vocalizations without slowing down the line spread of the plant. There also should be an emphasis on improving slaughter plant management. In the two plants where 32% and 12% of the cattle vocalized, the managers made no attempt to control abusive employee behavior. During the last 20 years, the author has observed that the single most important thing that determines how well animals will be treated is the attitude of management.

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